

## **Scientific Objectives and Capabilities of the DS2 Evolved Water Experiment**

A. S. Yen, B. C. Murray, and A. P. Zent

The New Millennium Deep Space 2 (DS2) Mars Microprobes will impact the surface of Mars at a latitude of approximately 75°S on December 3, 1999. The primary objective of this mission is to demonstrate penetrator technologies for future scientific applications. Nonetheless, measurements will also be obtained with the goal of characterizing the atmospheric structure during entry as well as the penetrability, thermal conductivity, and water ice content of the polar layered terrains.

In addition to demonstrating the ability to collect a subsurface sample, the evolved water experiment will test models of the south polar regions which indicate that water ice is stable at depths of 4 to 20 cm and greater [*Paige and Keegan*, 1994]. This prediction for the presence of ice is in contrast to atmospheric circulation models which suggest that water is irreversibly lost from southern latitudes and that the only extensive, permanent ice deposits are located in the northern hemisphere [*Houben et al.*, 1997]. Furthermore, MOC images from the 1998 aerobraking phase suggest a rougher and perhaps more devolatilized surface than inferred from Viking and Mariner 9 data. Thus, the direct determination of the presence or absence of near-surface ice by the DS2 probes may be important in the resolution of the fundamental questions about Mars regarding the global inventory of water and the climate history.

In pursuit of these objectives, a ~160 ml soil sample will be actively collected by a miniature drill and analyzed for water both thermally and spectroscopically. Specific capabilities and detection limits for the abundance of water ice will be presented at the meeting.